

Hb 3525

M4 A5

THE
VITAL STATISTICS OF MASSACHUSETTS FOR 1897,
WITH A LIFE TABLE

BASED UPON THE EXPERIENCE OF THE FIVE-YEAR PERIOD 1893-97.

By SAMUEL W. ABBOTT, M.D., *Secretary of the Board.*

HB 355 F
11445

MAY 23 1910
D. OF B.

21

June 2, 1910

THE VITAL STATISTICS OF MASSACHUSETTS FOR 1897, WITH A LIFE TABLE BASED UPON THE EXPERIENCE OF THE FIVE-YEAR PERIOD 1893-97.

The following brief digest embraces the vital statistics of the State for the year 1897, to which has been appended a life table, constructed mainly from the State census of 1895, and the mortality of the years 1893, '94, '95, '96 and '97.

POPULATION.

The assumed population in 1897, based upon the rate of increase from 1890 to 1895, was 2,613,023. Assuming the rate of increase of each sex to have been the same as that of the five-year period 1890-95, the males were 1,269,556 and the females, 1,343,467.

The number of registered marriages was 23,038; of births, 73,205; and of deaths, 47,419.

MARRIAGES.

The total number of marriages was 23,038, and the marriage-rate was 8.82 per 1,000 of the living population, or 17.64 per 1,000 (persons married). The following table expresses the seasonal marriage-rate for 1897 and for the period 1876-95:—

Marriages by Months, Quarters and Half-years.

	Marriages, 1897.	MONTHLY RATIO REDUCED TO A DAILY STANDARD OF 100.			20 Years — 1876-95.
		Months.	Quarters.	Half-years.	
January,	1,738	89.2	} 79.4	} 96.6	97.0
February,	1,563	88.8			92.4
March,	1,188	61.0			54.9
April,	1,862	98.8	} 113.6	} 104.2	101.8
May,	1,553	79.7			89.5
June,	3,082	163.5			126.2
July,	1,537	78.9	} 92.2	} 104.2	82.1
August,	1,607	82.5			80.1
September,	2,187	116.0			112.0
October,	2,571	132.0	} 116.2	} 104.2	129.4
November,	2,569	136.3			147.8
December,	1,581	81.2			89.1
Total,	23,038	—	—	—	—
Mean,	—	100.0	—	—	100.0

BIRTHS.

The living births in 1897 were 73,205, and the birth-rate was 28.02 per 1,000. This rate was less than that of 1896, but greater than that of any previous year since 1874, except those of 1892 and 1893. The birth-rate of the twenty-year period 1876-95 was 25.86. The following table expresses the seasonal birth-rate for 1897 and for the period 1876-95:—

Births by Months, Quarters and Half-years (1897 and 1876-95).

MONTHS.	Births.	MONTHLY RATIO REDUCED TO A STANDARD OF 100 PER DAY.			20 Years— 1876-95.
		Months.	Quarters.	Half-years.	
January,	6,265	100.8	} 101.3	} 97.2	95.6
February,	5,634	100.3			98.6
March,	6,388	102.7			98.0
April,	5,705	94.8	} 93.5	} 94.9	94.9
May,	5,665	91.1			94.0
June,	5,693	94.6			98.1
July,	6,356	102.2	} 104.6	} 102.6	104.1
August,	6,708	107.9			106.6
September,	6,238	103.7			104.4
October,	6,330	101.8	} 100.6	} 101.3	101.3
November,	6,015	99.97			101.5
December,	6,208	99.8			102.7
Total,	73,205	100.0	100.0	100.0	100.0

The order of intensity was as follows, beginning with the month having the highest daily birth-rate: August, September, March, July, October, January, February, November, December, April, June, May. This corresponds fairly with the normal means for the period 1876-95, in which the months having the highest daily birth-rates were August and September, and the lowest in May. For the past forty years the last half of each year has usually had a higher birth-rate than the first half, but the difference which existed at the early part of the period has gradually been growing less.

Still-births.—The number of still-births registered was 2,652, of which number 1,636 were males, 1,005 were females, and the sex of 11 was not stated. The ratio of males to females was as 1,628 to 1,000. The total number of births living and dead was 75,857.

Sexes.—Of the total number of living births, 37,689 were males and 35,489 were females, being in the ratio of 1,062 males to each

1,000 females. In this estimate 27 births are excluded, the sex of which was not stated.

The births for the period 1876-95 indicated a ratio of 10.53 males to 1,000 females.

DEATHS.

The registered deaths in 1897 were 47,419 and the death-rate was 18.15. This was lower than that of any year since 1879, and, with the exception of 1878 and 1879, the lowest since 1867.

Sex. — Of the whole number of deaths, excluding the still-born, 24,004 were males and 23,415 were females. The death-rate of males was 18.91 per 1,000 and that of females 17.39 upon the assumed population as stated on page 799.

Ages. — The most important factor in the general death-rate is the death-rate of infants under one year, which is usually expressed as a ratio per 1,000 births, since the census enumeration at the early years of life is unreliable. The numbers dying at this period are high both absolutely and relatively, while those who die at extreme old age are only relatively high in number. For more accurate information on this subject the life tables following this summary may be consulted.

The deaths under one year in 1897 were 10,751, which was equivalent to a death-rate of 146.9 per 1,000 births. The deaths at the next ages of life were as follows: second year, 2,257; third year, 1,058; fourth, 744; fifth, 493; and for the two five-year periods 5-10 and 10-15, 1,287 and 682. For the death-rates at these and later ages see life table.

Infant Mortality.

In the twenty-eighth annual report of the Board, page 753, a table is presented, giving the statistics relative to infant mortality in each of the 32 cities of the State for the ten years 1881-90.

In the following table the figures are presented for the next seven years, 1891-97, with two parallel columns, by means of which the rank of each city may be compared for the two periods.

In these two last columns the infant mortality of the State is taken as a standard of comparison, or mean of the whole period, the figure

100 representing the mean. The results may be read as follows: for every 100 deaths of infants under one year old which occurred in the State during the seven years 1891-97, there were 165 in Fall River, 107 in Boston, 71 in Beverly, etc.

Comparing these columns, there appears to have been a diminished infantile death-rate in the latter period in the following cities: Boston, Lawrence, Salem, Holyoke, Cambridge, Chelsea, Springfield, Haverhill, Marlborough, Pittsfield, Worcester, Somerville, Brockton, Medford, Malden, Waltham and Beverly, and in the remaining cities it was increased.

The death-rate of the whole urban group was also diminished from 174.9 per 1,000 births in the entire period to 164.2 in the later period. That of the rural group, comprising the remainder of the State, remained practically the same (129.5) in both periods, while that of the whole State diminished from 160.4 per 1,000 births to 154.6.

Infant Mortality of Cities, 1891-97.

CITIES.	Births.	Deaths 0-1.	Infant Mortality.	RANK — THE STATE = 100.	
				1891-97.	1881-90.
Fall River, . . .	20,910	5,339	255.3	165	149
Lowell, . . .	18,397	4,185	227.5	147	139
Chicopee, . . .	4,282	917	214.2	139	110
Lawrence, . . .	10,788	2,163	200.5	130	133
New Bedford, . .	12,389	2,478	200.0	129	111
Salem, . . .	6,574	1,106	168.2	109	112
Boston, . . .	108,139	17,834	164.9	107	117
Newburyport, . .	2,250	364	161.8	105	95
Taunton, . . .	5,031	788	156.6	101	87
Holyoke, . . .	11,609	1,817	156.5	101	105
Cambridge, . . .	17,038	2,590	152.0	98	107
Chelsea, . . .	6,614	998	150.9	98	104
Springfield, . . .	10,001	1,459	145.9	94	98
Haverhill, . . .	5,870	835	142.2	92	98

Infant Mortality of Cities, 1891-97 — Concluded.

CITIES.	Births.	Deaths 0-1.	Infant Mortality.	RANK—THE STATE = 100.	
				1891-97.	1881-90.
Gloucester, . . .	4,654	655	140.7	91	86
Lynn, . . .	11,473	1,608	140.2	91	88
Woburn, . . .	3,058	425	139.0	90	79
Fitchburg, . . .	6,273	865	137.9	89	84
Everett, . . .	4,057	552	136.0	88	82
Marlborough, . . .	2,958	400	135.2	87	96
Pittsfield, . . .	3,766	505	134.1	87	90
Northampton, . . .	2,711	362	133.5	86	86
Worcester, . . .	20,659	2,738	132.5	86	97
Somerville, . . .	9,866	1,295	131.3	85	96
North Adams, . . .	4,600	600	130.4	84	72
Brockton, . . .	5,381	687	127.7	83	91
Newton, . . .	4,847	600	123.8	80	70
Quincy, . . .	4,681	555	118.6	77	77
Melrose,* . . .	1,854	217	117.0	76	—
Medford, . . .	2,530	291	115.0	74	81
Malden, . . .	5,667	650	114.7	74	83
Waltham, . . .	3,786	424	112.0	72	82
Beverly, . . .	1,733	191	110.2	71	74
Urban, . . .	344,039	56,493	164.2	106	109
Rural, . . .	132,119	17,113	129.5	84	80
THE STATE, . . .	476,158	73,606	154.6	100	100

* The figures for Melrose are introduced to facilitate future comparison, although that town had not become a city till after the period embraced in the table.

From an examination of the statistics of other towns having over 5,000 inhabitants in each, it appears that the town of Framingham

had the lowest infantile mortality (95.9) for the seven years, while Rockport had the highest (203.3 per 1,000 births). Further examination of the record shows that this high infantile mortality in Rockport occurred mainly among infants whose parents were natives of Finland, who were employed upon the granite quarries in Rockport.

The following table presents the infantile mortality of the towns having over 5,000 inhabitants in each (not cities), arranged with those having the highest infantile death-rates at the top of the list.

Infant Mortality of Towns having more than 5,000 Inhabitants in Each (not Cities), 1891-97.

[Deaths (0-1) per 1,000 births.]

Rockport,	203.3	Athol,	130.8
Stoughton,	188.2	Montague,	129.2
Palmer,	171.7	Peabody,	128.1
Ware,	171.2	Spencer,	127.9
Northbridge,	170.7	Clinton,	125.1
Braintree,	164.4	Concord,	124.6
Gardner,	163.2	Hyde Park,	123.7
Revere,	162.1	Dedham,	121.5
West Springfield,	159.5	Orange,	120.3
Southbridge,	159.2	Watertown,	118.9
Grafton,	154.4	Stoneham,	117.3
Hudson,	148.8	Westfield,	116.9
Millbury,	147.9	Franklin,	112.8
Wakefield,	145.6	Greenfield,	112.5
Milton,	145.4	Natick,	109.8
Webster,	143.5	Whitman,	108.0
Methuen,	142.4	Andover,	106.2
Weymouth,	140.4	North Attleborough,	105.2
Marblehead,	139.5	Plymouth,	104.5
Arlington,	138.8	Rockland,	103.5
Adams,	137.7	Milford,	103.4
Winchester,	135.4	Brookline,	101.4
Attleborough,	135.0	Danvers,	99.4
Amesbury,	134.2	Westborough,	96.9
Leominster,	134.0	Middleborough,	96.8
Blackstone,	133.3	Framingham,	95.9

The total living births which furnished the infantile mortality represented in these two periods (shown in the twenty-eight

annual report and in the present report) were nearly 1,000,000 (985,445), and the deaths under one year were 155,277.

Seasons of the Year. — The seasonal intensity of the death-rate is expressed in the following table. The standard employed for comparison is 100 deaths per day throughout the year. The actual number of daily deaths in 1897 was 129.9.

Deaths by Months, Quarters and Half-years (1897 and 1876-95).

MONTHS.	Deaths.	1897. MONTHLY RATIO REDUCED TO A STANDARD OF 100 DEATHS PER DAY.			20 Years — 1876-95.
		Months.	Quarters.	Half-years.	
January,	4,051	100.6	} 108.7	} 101.5	105.0
February,	3,929	108.0			100.0
March,	4,730	120.2			102.3
April,	4,057	104.1	} 94.3	} 98.5	102.1
May,	3,805	94.4			93.9
June,	3,291	84.4			83.5
July,	4,254	105.6	} 107.0	} 98.5	109.3
August,	4,566	113.4			120.0
September,	3,969	101.8			104.5
October,	3,806	94.5	} 90.1	}	93.1
November,	3,475	89.1			88.9
December,	3,486	86.6			96.6
Totals,	47,419	—	—	—	—
Means,	—	100.0	100.0	100.0	100.0

By this table it appears that the greatest intensity of the seasonal death-rate was in March and in August and the least was in May and June, in 1897, while the highest in the twenty-year period (1876-95) was in July and August and the lowest was in June and November.

CAUSES OF DEATH.

In the following table are presented the ten most destructive causes and groups of causes of death in Massachusetts for the ten-year period, 1888-97, arranged in the order of their intensity. From this table it appears that the relative intensity of consumption, brain diseases, pneumonia, heart diseases and cholera infantum continued very much in the same order throughout the period. The only change in the table, as compared with that of 1896, is in the last two causes, diphtheria and croup having taken the tenth place in the list, instead of the ninth. The total number of deaths from these causes was 29,875, as compared with 31,146 in 1896, a

difference of 1,271 in favor of 1897. The deaths from consumption, brain diseases, heart diseases, cholera infantum, cancer, old age and diphtheria were less than those of 1896, while those from pneumonia, kidney diseases and bronchitis were more than those of 1896 from the same causes.

In the tables on pages 807-809 are presented the deaths and death-rates from fifteen causes of death for the twenty years 1878-97. These include the principal infectious diseases, together with certain other destructive causes and groups of causes.

The columns contain the absolute numbers in each case, together with the death-rate per 10,000 of the living population and the percentage of the total mortality.

From this table it appears that the death-rate from small-pox, measles, scarlet fever, diphtheria, typhoid fever, cholera infantum, child-birth, consumption, dysentery and whooping-cough in 1897 was less than the mean of the twenty-year period 1878-97, while that of pneumonia, cancer, heart diseases, kidney diseases and brain diseases was greater than the twenty-year mean.

Mortality from Ten Prominent Causes, 1888-97.

[illegible]

STATISTICS OF CERTAIN CAUSES OF DEATH, MASSACHUSETTS, 1878-97
Deaths, and Ratios compared with Population and Total Mortality.

YEARS.	SMALL-POX.			MEASLES.			SCARLET FEVER.			DIPHTHERIA AND CROUP.			TYPHOID FEVER.		
	Deaths.	Death-rate per 10,000 Living.	Percentage of Total Mortality.	Deaths.	Death-rate per 10,000 Living.	Percentage of Total Mortality.	Deaths.	Death-rate per 10,000 Living.	Percentage of Total Mortality.	Deaths.	Death-rate per 10,000 Living.	Percentage of Total Mortality.	Deaths.	Death-rate per 10,000 Living.	Percentage of Total Mortality.
1878,	2	.01	.01	305	1.8	0.97	404	2.3	1.29	2,517	14.6	8.04	679	3.9	2.17
1879,	7	.04	.02	19	0.1	0.06	850	4.8	2.67	2,293	13.1	7.21	637	3.6	2.00
1880,	38	.21	.11	236	1.3	0.67	574	3.2	1.63	2,394	13.4	6.78	882	4.9	2.50
1881,	47	.26	.13	230	1.3	0.63	397	2.2	1.09	2,383	13.1	6.54	1,072	5.9	2.94
1882,	45	.24	.12	68	0.4	0.18	318	1.7	0.86	1,771	9.6	4.81	1,079	5.8	2.93
1883,	5	.03	.01	321	1.7	0.85	575	3.1	1.52	1,621	8.6	4.29	860	4.6	2.28
1884,	3	.02	.01	75	0.4	0.20	627	3.3	1.69	1,646	8.6	4.45	875	4.6	2.37
1885,	19	.10	.05	313	1.6	0.82	587	3.0	1.54	1,523	7.8	4.00	768	3.9	2.02
1886,	-	-	-	130	0.6	0.35	331	1.7	0.89	1,558	7.8	4.18	800	4.0	2.15
1887,	3	.01	.007	455	2.2	1.12	594	2.9	1.46	1,628	7.9	3.99	922	4.5	2.26
1888,	8	.04	.02	219	1.0	0.52	504	2.4	1.20	1,831	8.7	4.35	943	4.5	2.24
1889,	6	.03	.01	171	0.8	0.41	185	0.9	0.44	2,214	10.2	5.30	891	4.1	2.13
1890,	1	.004	.002	114	0.5	0.26	196	0.9	0.45	1,626	7.3	3.74	835	3.7	1.92
1891,	1	.004	.002	236	1.0	0.52	246	1.1	0.54	1,218	5.3	2.70	821	3.6	1.82
1892,	2	.01	.004	88	0.4	0.18	669	2.9	1.37	1,455	6.2	2.98	827	3.5	1.70
1893,	9	.04	.02	276	1.2	0.56	810	3.4	1.65	1,394	5.8	2.84	750	3.1	1.53
1894,	33	.13	.07	98	0.4	0.21	649	2.6	1.39	1,801	7.4	3.85	748	3.1	1.60
1895,	-	-	-	117	0.5	0.25	483	1.9	1.02	1,784	7.1	3.75	680	2.7	1.43
1896,	-	-	-	137	0.5	0.28	249	1.0	0.50	1,677	6.6	3.40	723	2.8	1.46
1897,	4	.02	.008	158	0.6	0.33	342	1.3	0.72	1,426	5.5	3.01	607	2.3	1.28
Totals and means,	223	.06	.03	3,766	0.9	0.46	9,590	2.3	1.16	35,760	8.4	4.34	16,399	3.9	1.99

STATISTICS OF CERTAIN CAUSES OF DEATH, MASSACHUSETTS, 1878-97 — Continued.
Deaths, and Ratios compared with Population and Total Mortality — Continued.

YEARS.	CHOLERA INFANTUM.				CONSUMPTION.				CHILD-BIRTH.				DYSENTERY.	
	Deaths.	Death-rate per 10,000 Living.	Percentage of Total Mortality.	Deaths.	Death-rate per 10,000 Living.	Percentage of Total Mortality.	Deaths.	Death-rate per 10,000 Living.	Percentage of Total Mortality.	Percentage of Births.	Deaths.	Death-rate per 10,000 Living.		
1878,	1,573	9.1	5.02	5,334	30.8	17.04	297	1.7	0.95	.706	602	3.5		
1879,	1,349	7.7	4.24	5,223	29.7	16.42	300	1.7	0.94	.723	372	2.1		
1880,	2,118	11.9	6.00	5,494	30.8	15.57	316	1.8	0.90	.700	395	2.2		
1881,	1,861	10.3	5.10	5,886	32.4	16.14	370	2.0	1.01	.799	360	2.0		
1882,	2,159	11.7	5.87	5,865	31.8	15.94	351	1.9	0.95	.751	398	2.2		
1883,	1,941	10.3	5.14	5,931	31.6	15.71	366	1.9	0.97	.755	336	1.8		
1884,	2,081	10.9	5.63	5,798	30.4	15.67	323	1.7	0.87	.649	254	1.3		
1885,	1,852	9.5	4.86	5,955	30.7	15.63	350	1.8	0.92	.700	253	1.3		
1886,	1,931	9.7	5.18	5,897	29.5	15.83	303	1.5	0.81	.581	243	1.3		
1887,	2,131	10.4	5.23	5,871	29.6	14.40	280	1.4	0.69	.514	266	1.3		
1888,	2,195	10.4	5.21	5,728	27.1	13.61	277	1.3	0.66	.491	248	1.2		
1889,	2,156	9.9	5.16	5,681	25.7	13.36	303	1.4	0.73	.517	299	1.4		
1890,	2,491	11.1	5.72	5,791	25.9	13.31	365	1.6	0.84	.615	220	1.0		
1891,	2,771	12.1	6.13	5,484	24.0	12.14	269	1.2	0.60	.416	234	1.0		
1892,	2,898	12.4	5.94	5,739	24.5	11.77	343	1.5	0.70	.508	193	0.8		
1893,	2,704	11.3	5.51	5,627	23.1	11.26	317	1.3	0.65	.459	231	1.0		
1894,	2,676	10.9	5.72	5,463	22.3	11.67	325	1.3	0.69	.474	216	0.9		
1895,	2,377	9.5	5.00	5,486	21.9	11.54	380	1.5	0.80	.549	209	0.8		
1896,	2,957	11.6	5.99	5,636	21.7	11.21	328	1.3	0.66	.453	407	1.6		
1897,	2,231	8.5	4.70	5,431	20.8	11.45	314	1.2	0.66	.429	209	0.8		
Totals and means,	44,452	10.5	5.39	113,020	26.7	13.72	6,477	1.5	0.79	.583	5,945	1.4		

STATISTICS OF CERTAIN CAUSES OF DEATH, MASSACHUSETTS, 1878-97 — *Concluded.*
Deaths, and Ratios compared with Population and Total Mortality — Concluded.

YEARS.	PNEUMONIA.			WHOPING-COUGH.			CANCER.			KIDNEY DISEASES.			HEART DISEASES.			BRAIN DISEASES.		
	Deaths.	Death-rate per 10,000 Living.	Percentage of Total Mortality.	Deaths.	Death-rate per 10,000 Living.	Percentage of Total Mortality.	Deaths.	Death-rate per 10,000 Living.	Percentage of Total Mortality.	Deaths.	Death-rate per 10,000 Living.	Percentage of Total Mortality.	Deaths.	Death-rate per 10,000 Living.	Percentage of Total Mortality.	Deaths.	Death-rate per 10,000 Living.	Percentage of Total Mortality.
1878, .	2,171	12.6	6.93	400	2.3	1.28	807	4.7	2.58	615	3.6	1.96	1,442	8.3	4.61	2,778	16.1	8.87
1879, .	2,647	15.1	8.32	392	1.7	0.95	862	4.9	2.71	693	3.9	2.18	1,515	8.6	4.76	2,820	16.1	8.87
1880, .	3,076	17.3	8.72	230	1.3	0.65	928	5.2	2.63	698	3.9	1.98	1,726	9.7	4.89	3,210	18.0	9.10
1881, .	2,967	16.4	8.14	217	1.2	0.59	949	5.2	2.60	825	4.5	2.26	1,937	10.7	5.31	3,355	18.5	9.20
1882, .	2,932	15.9	7.97	265	1.4	0.72	987	5.3	2.68	877	4.7	2.38	2,025	11.0	5.50	3,393	18.4	9.22
1883, .	3,045	16.2	8.07	137	0.7	0.36	1,026	5.5	2.72	959	5.1	2.54	2,153	11.5	5.70	3,562	19.0	9.44
1884, .	2,646	13.9	7.15	410	2.1	1.11	1,060	5.6	2.87	1,000	5.2	2.70	2,117	11.1	5.72	3,669	19.2	9.92
1885, .	3,468	17.9	9.10	184	0.9	0.48	1,087	5.6	2.85	1,088	5.6	2.86	2,227	11.5	5.85	3,894	20.0	10.22
1886, .	2,836	14.2	7.61	271	1.4	0.73	1,104	5.5	2.96	1,135	5.7	3.05	2,325	11.6	6.24	3,844	19.2	10.32
1887, .	3,348	16.3	8.21	282	1.1	0.57	1,174	5.7	2.88	1,120	5.4	2.75	2,690	13.1	6.60	4,257	20.7	10.44
1888, .	3,716	17.6	8.83	245	1.2	0.58	1,275	6.0	3.03	1,318	6.2	3.13	3,061	14.5	7.27	4,522	21.4	10.74
1889, .	3,440	15.8	8.23	310	1.4	0.74	1,325	6.1	3.17	1,258	5.8	3.01	3,280	15.1	7.85	4,313	19.8	10.32
1890, .	4,038	18.0	9.28	363	1.6	0.83	1,387	6.2	3.19	1,273	5.7	2.92	3,417	15.3	7.85	4,389	19.6	10.08
1891, .	4,337	18.9	9.60	219	1.0	0.48	1,395	6.1	3.09	1,474	6.4	3.26	3,592	16.7	7.95	4,711	20.6	10.43
1892, .	5,020	21.5	10.30	248	1.1	0.51	1,402	6.0	2.88	1,535	6.6	3.15	3,733	15.0	7.65	5,036	21.5	10.33
1893, .	5,499	23.0	11.20	274	1.1	0.56	1,533	6.4	3.12	1,635	7.0	3.43	3,511	14.7	7.15	5,144	21.5	10.48
1894, .	4,101	16.8	8.76	435	1.8	0.93	1,568	6.4	3.35	1,721	7.0	3.68	3,432	14.0	7.33	4,995	20.4	10.67
1895, .	4,652	18.6	9.79	269	1.1	0.57	1,749	7.0	3.68	1,860	7.4	3.91	3,566	14.3	7.50	5,062	20.2	10.65
1896, .	4,703	18.4	9.52	282	1.1	0.57	1,798	7.0	3.64	1,945	7.6	3.94	3,664	14.3	7.42	5,404	21.2	10.95
1897, .	4,796	18.4	10.11	171	0.7	0.36	1,737	6.6	3.66	1,943	7.4	4.10	3,615	13.8	7.62	5,276	20.2	11.13
Totals and means,	73,438	17.3	8.91	5,464	1.3	0.66	25,153	5.9	3.05	25,022	5.9	3.04	55,028	13.0	6.68	83,634	19.7	10.15

A MASSACHUSETTS LIFE TABLE FOR THE FIVE YEARS 1893-97.

The usefulness of life tables is not confined to the work of life insurance. A life table also serves as an index of the sanitary condition of the community out of whose data it is constructed.

Life tables differ for the same group of population from year to year, and they also differ when calculated from the statistics of different portions of a group of inhabitants, as, for example, the city of Boston, compared with any of the outlying districts beyond its borders.

The work of constructing a life table for any American State or city is necessarily less satisfactory in its results than the work of making a similar table for any of the civilized nations or communities of Europe, since most foreign populations are much more stationary than our own.

The English life tables, compiled by Dr. Farr, which have proved universally useful as standards of good work in this direction, were usually calculated from the living population at two successive census enumerations and from the deaths occurring in the intervening period. The factor of migration, however, in an American State affects the accuracy of such a calculation; hence a somewhat different method has been employed in constructing the following table, and a shorter period of five years has been selected. Massachusetts has an advantage not enjoyed by many communities in having an intervening State census five years after the national census, and this advantage is especially useful in any State whose population is far from stationary.

The materials selected as the basis of the following table are the census of 1895, and the deaths, numbering 240,215, which were registered in the State in the five years 1893, 1894, 1895, 1896 and 1897. The mid-year of this period (1895) was the census year, and the census was taken very near the middle of that year (in the months of May and June). The mean annual number of deaths at each age is compared with the population maintained at such age.

The limitations which affect the accuracy of a life table for Massachusetts are the following:—

1. *The Effect of Migration.*—The natural increase of the population, or that which results from the excess of births over deaths, has for many years constituted only a portion of the total increase

from year to year. The census enumerations of 1890 and 1895 showed an increase of 261,240, of which number the excess of births formed only 36 per cent., the balance, 64 per cent., being the difference between the numbers of immigrants and emigrants; or, in other words, the effect of migration exceeded that of natural increase in the ratio of nearly 2 to 1.

Moreover, the increment by means of immigration is not uniform at the different age periods, fully one-half of the immigrants being between fifteen and thirty years of age, while the numbers at the extremes of life are comparatively small.

The following table presents the classified material out of which the life table is constructed:—

Population of Massachusetts, 1895, and Deaths, 1893-97.

AGE PERIODS.	POPULATION, 1895.			DEATHS, 1893-97.		
	Total.	Males.	Females.	Total.	Males.	Females.
0-5,	235,647*	118,453*	117,194*	78,779	42,710	36,069
5-10,	224,119	112,296	111,823	6,730	3,345	3,385
10-15,	202,900	101,574	101,326	3,460	1,655	1,805
15-20,	225,881	110,565	115,316	6,305	2,899	3,406
20-25,	265,983	123,692	142,291	9,982	4,899	5,083
25-35,	465,943	227,630	238,313	20,148	10,103	10,045
35-45,	341,535	168,997	172,538	18,832	9,610	9,222
45-55,	245,586	118,417	127,169	19,377	9,895	9,482
55-65,	157,651	72,766	84,885	22,334	11,278	11,056
65-75,	90,088	41,040	49,048	25,561	12,694	12,867
75-85,	35,405	15,460	19,945	20,547	9,675	10,872
85-95,	6,123	2,180	3,943	7,105	2,713	4,392
Over 95,	308	77	231	559	152	407
Age unknown,	3,014	1,554	1,460	496	378	118
Total,	2,500,183	1,214,701	1,285,482	240,215	122,006	118,209

* The population figures in this line (0-5) were not used in the construction of the life table, but the figures employed were estimated from the registered births and the deaths under 5 years of age.

2. *Defects of the Census.*—Mr. Henry Gannett, in a paper contributed to the “Publications of the American Statistical Association” (Vol. IV., p. 99), estimates a “shortage in the census of 1890 of negro children of about a quarter of a million,” and of the native white children “about the same.” If this be correct, the entire shortage or deficiency in the total population, including that

among foreign whites, must leave at least a million unaccounted for in the United States.

A careful examination of the last two census enumerations of Massachusetts (those of 1890 and 1895) shows that Mr. Gannett's estimate is probably none too large.*

It is possible to supply the actual deficiency for the first four or five years of life, with some degree of accuracy, from the registered births; but beyond this period of life it is hardly practicable to make estimates which are of greater value than mere conjectures.

3. *The Practice of incorrectly reporting the Ages of the Living and the Dead.* — This error is of two kinds: (a) It invariably happens that greater numbers of persons are reported at the even ages, 20, 30, 40, etc. (both of the living and the dead), than at 19, 21, 29, 31, etc., in consequence of the common habit of using round numbers instead of giving the more accurate ages. This is in a measure eliminated by employing the periods used in England, 25–35, 35–45, etc., instead of 20–30, 30–40. (b) The habit, especially noted among unmarried females, of understating the ages of the living. This appears to a greater or less degree to be a common practice in all countries where census enumerations are made.

4. *Defects in Birth and Death Registration.* — These defects, so far as Massachusetts is concerned, are probably insignificant, and in this respect the material collected by the registration officers of cities and towns compares favorably in its accuracy with that of foreign nations and communities having established systems of registration. Great pains are taken in most of the municipalities to obtain accurate and full returns, since a *pro rata* fee is allowed to the local officers for them; moreover, the certifiers of births and deaths (physicians, midwives and undertakers) are compelled, under penalty, to comply with the statutes requiring such returns.

There is also a comparatively small number of persons included in the census whose sex and ages are unknown, and the same may be said of the registered deaths, the latter being probably mostly deaths of prematurely born infants, and a small number of bodies of unknown persons found dead.

Certain comments and explanatory statements are necessary in relation to the construction of the following tables.

* Mr. E. B. Elliott also assumes an approximate shortage for the first five years of life alone of 100,000 in the United States census of 1870. Volume on Vital Statistics, page 522.

The figures for the first five years of life have been compiled from the births, and from the deaths which occurred among children under five years of age. The census figures for these five years were disregarded, for the reasons already stated in former reports, and in accordance with the common usage in other countries.*

Dr. Farr says, in regard to this subject: "We can scarcely feel surprised to find, in the various censuses of Europe, errors in the statements of age, traceable to ambiguities of language. In the early years of life these mistakes demand attention, otherwise they may lead us into such grave mistakes as we have to notice." These well-known defects may be corrected without serious difficulty for the first years of life.

An exact and accurate life table of any population or community can be made only by taking a definite number of persons, say 100,000 or 1,000,000 at birth, and following their life history, noting the age of each person at death, until the entire number has ceased to live. Such a process is impossible, especially in an American community, subject, as it is, to the variable effect of migration.

In view of this manifest impossibility, it is therefore necessary to construct an approximate table from such data as are accessible, bearing in mind the limitations, to which reference has been made, and making such corrections of errors as are customary in the construction of similar life tables for other communities. Starting with a hypothetical 1,000,000 or 100,000 births, this generation of persons of both sexes may be followed, with a reasonable degree of accuracy, to the extinction of the last survivor, at the age of one hundred or more, by the application of the rules which it is customary to employ. In the case of Massachusetts we have selected the number 100,000 as the basis of the table, since this is the largest round number near the exact number of annual births in the State. The sexes at the time of birth are unequally distributed, the males being in the ratio of 51.350 and the females 48.650 out of each 100,000 born during the period selected for the construction of the table. These numbers are therefore taken as the numbers at birth of the two sexes, out of the hypothetical 100,000 born.

In order to eliminate the effects of epidemic years or of abnormal conditions existing in the census year 1895, the mean annual deaths

* Twenty-sixth Annual Report Massachusetts Board of Health, page liv; also Dr. Farr's Vital Statistics, Memorial volume, page 207.

of the five years 1893-97 are employed to obtain the death-rates at each year of life. In the English life tables it has been customary to estimate the population at the middle of a given year for life-table purposes, the census being taken on the first of April. The State census of Massachusetts being taken at a time quite near the middle of the year, no allowance has been made for the few days elapsing between the time of such taking and the mid-year, since such allowance would at most only affect the second place of decimals in a death-rate expressed as a ratio per 1,000 living of a given age. Moreover, the population enumerated in May, near the middle of a five-year period, differs much less from the actual mean than that which is taken near the middle of a ten-year period, as compared with a mean of the two extremes of such period.

Dr. Billings says, in his introductory remarks in the twelfth volume of the tenth census, 1880 (page cxliii): "The preparation for any given locality, race or occupation, *in this country*, of a life table which shall accurately represent the tendency to death or the probability of survival at each age, is practically impossible, because of the want of accuracy in the necessary data, and because of the irregular migrations of the population. It should be clearly understood that all tables of vital statistics, including data derived from large numbers of people, even when these are obtained by the most accurate census possible, and by the most complete system of registration which can be enforced, give probabilities only, and that scientific accuracy in this field is practically unattainable." The foregoing remarks apply with less force to Massachusetts than to the United States as a whole, since our own State has had a system of registration in existence since 1842, the results of which may now be considered as fairly accurate. Dr. Billings therefore publishes an approximate life table in the volume referred to for Massachusetts and for certain other communities, from such data as were obtainable for the census year 1880.

In the life table on pages 822-826 pains have been taken to make it as accurate as possible from the data at hand. The compiler is entirely responsible for whatever errors or inaccuracies it may contain.

One hundred thousand infants, followed throughout their first year during the period named, in Massachusetts, yield 90,250 years of life. To obtain this mean of the infants living throughout the first year, the following method was employed:—

All of the deaths of infants under one month old which occurred in the years 1893-97 were tabulated from the mortality returns in the office of the Secretary of State, also those of infants who died in the second and the third months of life separately, then those of infants who died in the three succeeding months of life (3-6) in one group, and then those who died in the succeeding six months in another group. From these data, and from the births registered in the five years ending with June 30, 1897, the figures for the first year of life were calculated after the method shown by Dr. Farr in his life table No. 3, page xxiii.

The foregoing mean, 90,250 (the arithmetical mean of the series $l_0, l_{\frac{1}{12}}, l_{\frac{2}{12}} \dots l_1$), is used as the first term of column P (see tables 1 and 2). All of the succeeding terms in the column for the years 1, 2, 3, 4, etc., are the means of the terms in the preceding column l_x , using the formula $P_x = \frac{l_x + l_{x+1}}{2}$

The total number of persons living under five years of age in the State in 1895, as stated by the census, was 235,647; but the number as calculated from the living births in these years was 294,604, or 58,957 more than the figures of the census would indicate. No allowance is made in this estimate for migration, which would slightly increase the difference. The effect of migration at this period of life, however, is much less than at later ages, especially from fifteen to thirty years.

Population under 5 Years.

STATE CENSUS OF 1895.		Calculated from the Births and Deaths under 5.	Difference.
Males,	118,453	149,582	31,129
Females,	117,194	145,022	27,828
	235,647	294,604	58,957

Description of the Tables.

In tables 1 and 2, column x , ages, presents the ages for each sex from birth up to 100 years.

Column d_x presents the numbers of those dying in each age of life for each sex.

Column l_x presents the survivors of each sex, out of 100,000 of both sexes, at each age of life, beginning with 51,350 males and 48,650 females at birth.

Column P_x presents the population maintained by the numbers in column l_x .

Column Q_x shows the aggregate number of years which the persons at each age in the table will live, until their extinction by death.

Column $E_x \left(= \frac{Q_x}{l_x} \right)$ is the mean future life time of the persons living at each age in the table, the expectation of life.

Column m_x (Table 3), the mortality column, presents the mortality per unit of the population at each age of life, the figures being obtained by dividing the deaths in each age by the population at such ages, the proper corrections and interpolations having been applied. From this column (m_x) the probability of living at each year of age (p_x) (Table 3) is obtained by the formula $p_x = \frac{2 - m_x}{2 + m_x}$ applied to each year of the series.

Column l_x is obtained by the formula $l_x \times p_x = l_{x+1}$, and column P_x is obtained by the formula $\frac{l_x + l_{x+1}}{2}$.

What may be learned from these Tables.

It appears that, out of 100,000 children born alive in Massachusetts in 1895, 16,000, or nearly one-sixth, die before arriving at the age of one year; 78,963, or nearly four-fifths, attain the age of three years; 77,051 survive the age of five years, or 77 per cent.; 50,126, or a little more than one-half, attain the age of fifty-three years; 25,406, or a little more than one-fourth, live to the age of seventy-two years.

These figures present very decided differences as compared with those which were published for 1855 by Mr. E. B. Elliott (sixteenth Massachusetts Registration Report, 1857). In those reports it was shown that the numbers dying before the close of the first year out of 100,000 born were 15,510, or very nearly the same as those for the year 1895 for the same age. At the end of three years the survivors were only 74 per cent., instead of 79 per cent., as in 1895, and that one-half had died before the close of the forty-first year, instead of surviving to the fifty-third, as in 1895.

In consequence of the fact that the numbers of each sex are unequal at birth, the males continue in greater numbers until the fifty-

third year, when the greater death-rate of the males has reduced their number below that of the females, and the females continue in excess throughout the remainder of life. Observing the table more closely, it appears that the comparative intensity of the death-rate of the sexes varies at different points in the table. For the first five years the death-rate of males exceeds that of females. From age five to age nineteen inclusive the rate of females exceeds that of males, and from age twenty to the end of life the death-rate of females is less than that of males.

In Table 3 are presented two columns in which are shown the probability of living one year from each age and the mortality per unit of the population at each year. At birth the probability of living a year is for males .82569 and for females .84939, that of boys at birth being about the same as for men of eighty-six, and that of girls about the same as that of women at eighty-six or eighty-seven.

The probability of living a year is at its highest point for boys at age twelve (.99722), and for girls it is about the same for age eleven as at age twelve (.99695 and .99693).

A comparison of the death-rates of Massachusetts at different periods presents certain points worthy of notice.

The death-rate of children under five and especially of those under one year of age has not undergone very marked changes (see table); but that of all ages from five to forty has very perceptibly diminished, while that of ages above forty has increased. This result has been produced by the great reduction in the number of deaths from infectious diseases, including consumption, which occur in the early period of life, from two years up to thirty. By this means a much larger ratio of the population than formerly survives to live throughout the useful and wage-earning period of life. This causes a material increase in the number of years lived at the later ages of life.

These persons being spared from the diseases incident to childhood, the relative mortality from the diseases of adult life and of old age is naturally increased.

This decided increase in the number of survivors throughout the useful ages of life has a marked effect upon the vitality of the population. It is undoubtedly due in no small degree to the increased attention which has everywhere been given in the past twenty-five years to public hygiene.

The population of almost any one of the United States differs essentially from the more stationary populations of the old world in the fact that it is constantly being recruited by the addition of con-

siderable numbers of immigrants at the healthy ages of life. These additions constitute a selected class, not only on account of their age distribution (50 per cent. are between the ages of fifteen and thirty), but also because many of the weaklings must be left behind, in consequence not only of their inability to become wage-earners but on account of the exclusive action of the immigration laws.*

One consequence of this is the comparatively large number of persons at the later ages of life, an effect which has been produced by the long continuance of immigration.

DATA FOR CONSTRUCTION OF DIAGRAM OF SURVIVORS.

Table showing Survivors at Different Ages of Life out of 10,000 born.

	Sweden—† 1881-90.	England and Wales—‡ 1881-90.	Massachu- setts— 1893-97.	Massachu- setts—§ 1855.	Spain— 1878-82.
0,	10,000	10,000	10,000	10,000	10,000
1,	8,895	8,536	8,400	8,449	8,083
2,	8,586	8,067	8,054	7,733	7,060
3,	8,399	7,878	7,896	7,424	6,433
4,	8,258	7,758	7,786	7,258	6,161
10,	7,882	7,495	7,487	6,873	5,747
15,	7,713	7,423	7,366	6,726	5,602
20,	7,551	7,281	7,167	6,437	5,413
25,	7,338	7,090	6,906	6,100	5,164
30,	7,109	6,844	6,615	5,748	4,908
35,	6,876	6,550	6,308	5,408	4,596
40,	6,628	6,216	5,988	5,078	4,378
45,	6,349	5,839	5,651	4,748	4,088
50,	6,043	5,405	5,275	4,409	3,765
55,	5,687	4,891	4,821	4,022	3,381
60,	5,239	4,275	4,272	3,597	2,914
65,	4,658	3,534	3,622	3,065	2,327
70,	3,900	2,684	2,869	2,475	1,666
75,	2,948	1,786	2,042	1,833	997
80,	1,872	970	1,266	1,059	465
85,	894	388	654	437	149
90,	275	100	259	118	40
95,	—	14	67	20.5	—
100,	—	.9	9	2.2	—

* "If on examination there shall be found among such passengers any convict, lunatic, idiot or any person unable to take care of himself or herself, without becoming a public charge, . . . such person shall not be permitted to land." (Extract from immigration act of Aug. 3, 1882, section 2.)

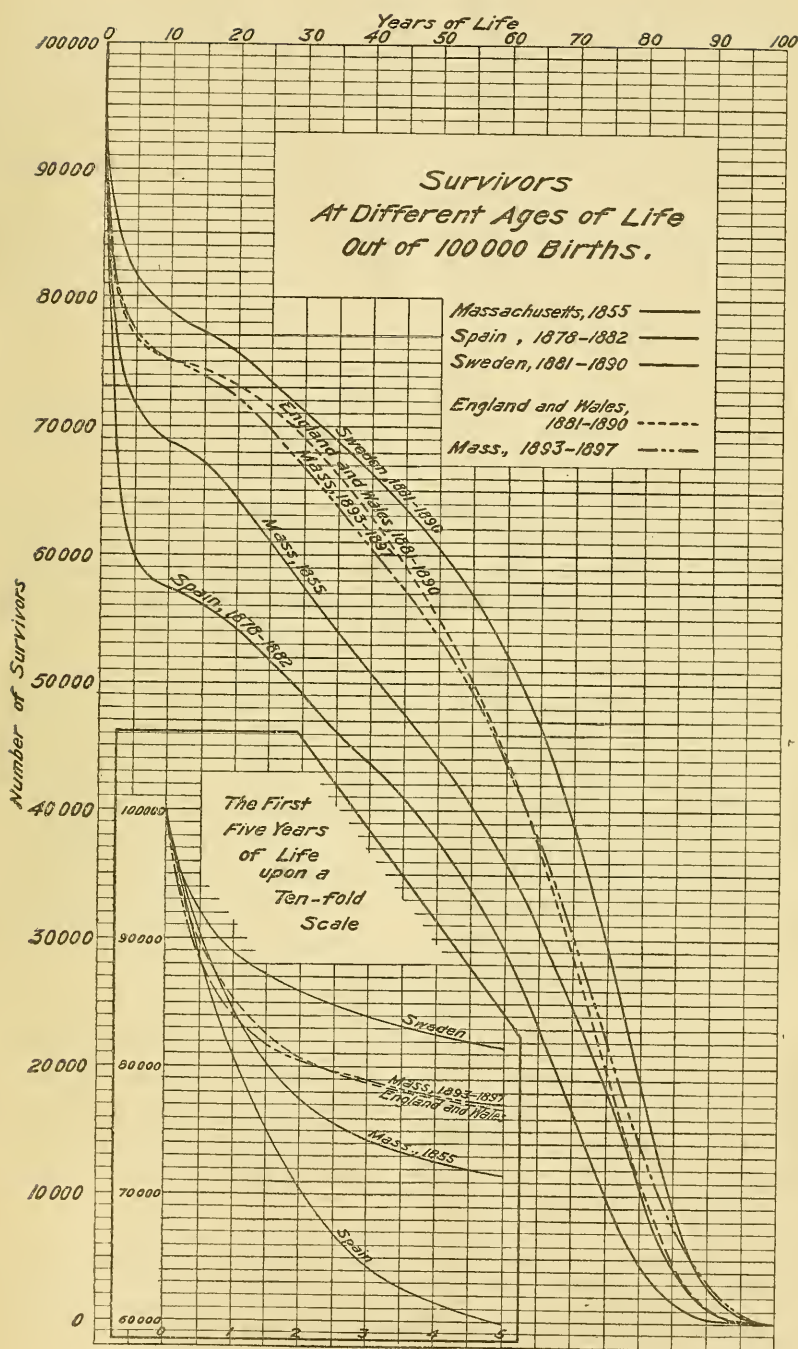
† For convenience of comparison with Mr. Elliott's table of 1855, the figures of this table are reduced to a scale of 10,000, while the diagram is made upon a scale of 100,000.

‡ Fifty-fifth Report of Registrar General. Supplement, vol. 1, page xiv. Vol. 10, part 1, page 75.

§ Sixteenth Registration Report, Massachusetts, 1857.

|| Bulletin de l'institut international de statistique.

NOTE.—In consequence of corrections made after the construction of the diagram on page 819, the line for Massachusetts survivors, 1893-97, should be placed one to two millimeters lower, after age 15.



The preceding table and diagram present the numbers of survivors at each of several age periods in Sweden, England, Spain and Massachusetts (in the latter for the year 1855 and for the period of 1893-97). Sweden is selected as a country having a very low death-rate, and also because it is occasionally selected as a standard of a healthy population. Spain, on the contrary, has a high death-rate, chiefly due to excessive mortality in the early years of life.

In consequence of the close contiguity of the lines in the first five years of life, the figures for the first five years are given upon a separate diagram, in which the divisions representing the age periods are increased ten-fold.

A brief review of the life tables of Massachusetts shows that quite marked changes have taken place from year to year in the life history of the population.

The earliest life table in existence pertaining to the population of Massachusetts is that of Edward Wigglesworth, D.D., of Harvard University, made from records of bills of mortality collected prior to 1789.* The total number of deaths employed in the construction of this table was 4,893.

Its defects consisted mainly in the limited numbers used for computation, in the crude method of recording the ages of the population by the first census (in five periods only, all under 10, 10-16, 16-26, 26-45, and all over 45), and in the fact that the table was framed on the assumption of a stationary population. This table was for many years an authority in the courts of the Commonwealth.

In 1855 a table for Massachusetts was published in the Sixteenth Registration Report (1857) by the eminent statistician, Mr. E. B. Elliott. This table is calculated from 16,086 deaths, which occurred in 166 towns of Massachusetts in the year 1855.†

In the tenth census of the United States, Vol. 12, part 2, pp. 773-791, Dr. Billings publishes approximate life tables for the population of Massachusetts and other States, and for certain cities. Those of Massachusetts are for the white population of the State, and for the census year 1880, comprising 31,341 deaths, and also for the whole population of the State for the five years ended June 30, 1882, and comprising 171,639 deaths.

* Published in the second volume of the "Transactions of the American Academy," 1793.

† The calculation was limited to the returns of these 166 towns, since the system of registration then in practice in the State was not believed to be "sufficiently complete to furnish data for a life table for the whole State." These 166 towns constituted two-thirds of the population of the State in 1855 (Sixteenth Registration Report, Massachusetts, page 199).

The statement of Dr. Josiah Curtis in the Sixteenth Registration Report of Massachusetts (1857)* as to the value of life tables is worthy of note. He says: "There are weightier reasons for desiring correct information concerning the comparative mortality of our communities. The governing powers and enlightened statesmen are enabled better to discharge their high and responsible duties to the people by a correct knowledge of the physical powers, possessions and resources of the inhabitants. . . . The Christian philanthropist and sanitarian will be enabled to give some definiteness and efficiency to their labors, by a correct knowledge of where, and to what purpose, the laws which prevail over life and death teach them to direct their laudable efforts. The question here forcibly arises, Have the records of registration in Massachusetts, or in any considerable portion thereof, ever been sufficiently complete to enable any one to determine with reliable accuracy what law or laws do prevail over the mortality of the inhabitants of the State, or such portions of it? We consider this question, and its answer, taken in their broader sense and application, as the most important practical consideration connected with our system of registration, and it affords extreme gratification to be able to give an affirmative answer to the question. Aside from its intrinsic value, it is creditable to the State of Massachusetts, because it is the first instance where such data have been thus furnished and thus used in any considerable community on this continent. The great practical results in the variety of their applications of such laborious deductions will furnish, not only immediately, but for years to come, the government and intelligent statesmen as well as others, with the means of determining many social and political questions of high practical value hitherto undeterminable."

* Page 197.

MASSACHUSETTS LIFE TABLE.

BASED ON THE MORTALITY OF THE FIVE YEARS, 1893-97.

TABLE NO. 1.—*Males.*

AGE.	Dying In Each Year of Age.	Born and Surviving at Each Age.	Population or Years of Life lived in Each Year of Age.	Years of Life Lived in and above Each Year of Age.	Expectation of Life at Each Year of Age.
<i>x.</i>	<i>d_x.</i>	<i>l_x.</i>	<i>P_x.</i>	<i>Q_x.</i>	<i>E_x.</i>
0,	8,849	51,350	46,343	2,264,048	44.09
1,	1,794	42,501	41,604	2,217,705	52.18
2,	818	40,707	40,298	2,176,101	53.46
3,	559	39,889	39,609	2,135,803	53.54
4,	424	39,330	39,118	2,096,194	53.30
5,	316	38,906	38,748	2,057,076	52.88
6,	252	38,590	38,464	2,018,328	52.30
7,	205	38,338	38,235	1,979,864	51.64
8,	170	38,133	38,048	1,941,629	50.92
9,	146	37,963	37,890	1,903,581	50.14
10,	123	37,817	37,755	1,865,691	49.33
11,	110	37,664	37,639	1,827,936	48.49
12,	104	37,584	37,632	1,790,297	47.63
13,	111	37,480	37,424	1,752,765	46.76
14,	135	37,369	37,301	1,715,341	45.90
15,	159	37,234	37,154	1,678,040	45.07
16,	181	37,075	36,984	1,640,886	44.26
17,	195	36,894	36,796	1,603,902	43.47
18,	211	36,699	36,593	1,567,106	42.70
19,	226	36,488	36,375	1,530,513	41.94
20,	241	36,262	36,141	1,494,138	41.20
21,	255	36,021	35,893	1,457,997	40.48
22,	268	35,766	35,632	1,422,104	39.76
23,	280	35,498	35,358	1,386,472	39.06
24,	289	35,218	35,073	1,351,114	38.36
25,	296	34,929	34,781	1,316,041	37.68
26,	301	34,633	34,482	1,281,260	37.00
27,	305	34,332	34,179	1,246,778	36.32
28,	309	34,027	33,872	1,212,599	35.64
29,	313	33,718	33,561	1,178,727	34.96
30,	316	33,405	33,247	1,145,166	34.28
31,	319	33,089	32,930	1,111,919	33.60
32,	319	32,771	32,611	1,078,989	32.93
33,	319	32,452	32,292	1,046,378	32.24
34,	320	32,133	31,973	1,014,086	31.56
35,	322	31,813	31,652	982,113	30.87
36,	325	31,491	31,328	950,461	30.18
37,	328	31,166	31,002	919,133	29.49
38,	331	30,838	30,672	888,131	28.80
39,	334	30,507	30,340	857,459	28.11
40,	337	30,173	30,004	827,119	27.41
41,	341	29,836	29,665	797,115	26.72
42,	346	29,495	29,322	767,450	26.02
43,	352	29,149	28,973	738,128	25.32
44,	359	28,797	28,617	709,155	24.63
45,	368	28,438	28,254	680,538	23.93
46,	379	28,070	27,880	652,284	23.24
47,	393	27,691	27,494	624,404	22.55
48,	410	27,298	27,093	596,910	21.87
49,	429	26,888	26,673	569,817	21.19

MASSACHUSETTS LIFE TABLE.

BASED ON THE MORTALITY OF THE FIVE YEARS, 1893-97.

TABLE NO. 1. — *Males* — Concluded.

AGE.	Dying In Each Year of Age.	Born and Surviving at Each Age.	Population or Years of Life lived in Each Year of Age.	Years of Life Lived in and above Each Year of Age.	Expectation of Life at Each Year of Age.
$x.$	$d_x.$	$l_x.$	$P_x.$	$Q_x.$	$E_x.$
50,	448	26,459	26,235	543,144	20.53
51,	466	26,011	25,778	516,909	19.87
52,	483	25,545	25,303	491,131	19.23
53,	502	25,062	24,811	465,828	18.59
54,	520	24,560	24,300	441,017	17.96
55,	539	24,040	23,770	416,717	17.33
56,	561	23,501	23,220	392,947	16.72
57,	585	22,940	22,647	369,727	16.12
58,	608	22,355	22,051	347,080	15.53
59,	636	21,747	21,429	325,029	14.95
60,	659	21,111	20,781	303,600	14.38
61,	677	20,462	20,113	282,819	13.83
62,	691	19,775	19,429	262,706	13.28
63,	709	19,084	18,729	243,277	12.75
64,	729	18,375	18,010	224,548	12.22
65,	748	17,646	17,272	206,538	11.70
66,	769	16,898	16,513	189,266	11.20
67,	789	16,129	15,734	172,753	10.71
68,	810	15,340	14,935	157,019	10.24
69,	827	14,530	14,116	142,084	9.78
70,	840	13,703	13,283	127,968	9.34
71,	845	12,863	12,440	114,685	8.92
72,	847	12,018	11,594	102,245	8.51
73,	842	11,171	10,750	90,651	8.11
74,	831	10,329	9,913	79,901	7.74
75,	816	9,498	9,090	69,988	7.37
76,	794	8,682	8,285	60,898	7.01
77,	769	7,888	7,503	52,613	6.67
78,	741	7,119	6,748	45,110	6.34
79,	707	6,378	6,024	38,362	6.01
80,	672	5,671	5,335	32,338	5.70
81,	632	4,999	4,683	27,003	5.40
82,	590	4,367	4,072	22,320	5.11
83,	546	3,777	3,504	18,248	4.83
84,	499	3,231	2,981	14,744	4.56
85,	452	2,732	2,506	11,763	4.31
86,	402	2,280	2,079	9,257	4.06
87,	353	1,878	1,701	7,178	3.82
88,	307	1,525	1,371	5,477	3.59
89,	263	1,218	1,086	4,106	3.37
90,	220	955	845	3,020	3.16
91,	181	735	644	2,175	2.96
92,	146	554	481	1,531	2.76
93,	116	408	350	1,050	2.57
94,	88	292	248	700	2.40
95,	66	204	171	452	2.22
96,	48	138	114	281	2.04
97,	33	90	73	167	1.86
98,	23	57	45	94	1.65
99,	15	34	26	49	1.44
100,	9	19	14	23	1.21

MASSACHUSETTS LIFE TABLE.

BASED ON THE MORTALITY OF THE FIVE YEARS, 1893-97.

TABLE NO. 2. — *Females.*

AGE.	Dying In Each Year of Age.	Born and Surviving at Each Age.	Population or Years of Life lived in Each Year of Age.	Years of Life Lived in and above Each Year of Age.	Expectation of Life at Each Year of Age.
x .	d_x .	l_x .	P_x .	Q_x .	E_x .
0	7,151	48,650	43,907	2,267,469	46.61
1	1,662	41,499	40,668	2,223,562	53.58
2	763	39,837	39,455	2,182,894	54.79
3	544	39,074	38,802	2,143,439	54.83
4	385	38,530	38,337	2,104,637	54.62
5	318	38,145	37,986	2,066,300	54.17
6	250	37,827	37,702	2,028,314	53.62
7	206	37,577	37,474	1,990,612	52.97
8	170	37,371	37,286	1,953,138	52.26
9	147	37,201	37,127	1,915,852	51.50
10	129	37,054	36,990	1,878,725	50.70
11	113	36,925	36,863	1,841,735	49.83
12	113	36,812	36,755	1,804,867	49.03
13	123	36,699	36,637	1,768,112	48.18
14	146	36,576	36,503	1,731,475	47.34
15	172	36,430	36,344	1,694,972	46.53
16	195	36,258	36,160	1,658,623	45.74
17	206	36,063	35,960	1,622,468	44.99
18	218	35,857	35,748	1,586,503	44.24
19	230	35,639	35,524	1,550,760	43.51
20	241	35,409	35,288	1,515,236	42.79
21	251	35,168	35,042	1,479,943	42.03
22	255	34,917	34,790	1,444,906	41.38
23	261	34,662	34,531	1,410,116	40.68
24	265	34,401	34,268	1,375,585	39.99
25	269	34,136	34,001	1,341,317	39.29
26	274	33,867	33,730	1,307,316	38.60
27	278	33,593	33,454	1,273,586	37.91
28	282	33,315	33,174	1,240,132	37.22
29	286	33,033	32,890	1,206,958	36.54
30	290	32,747	32,602	1,174,068	35.85
31	294	32,457	32,310	1,141,466	35.17
32	297	32,163	32,014	1,109,156	34.48
33	301	31,866	31,715	1,077,142	33.80
34	302	31,565	31,414	1,045,427	33.12
35	306	31,263	31,110	1,014,013	32.43
36	308	30,937	30,803	982,903	31.75
37	312	30,649	30,493	952,100	31.06
38	315	30,337	30,180	921,607	30.38
39	318	30,022	29,863	891,427	29.69
40	320	29,704	29,544	861,564	29.00
41	324	29,384	29,222	832,020	28.31
42	326	29,060	28,897	802,793	27.62
43	329	28,734	28,570	773,901	26.93
44	332	28,405	28,239	745,331	26.24
45	335	28,073	27,905	717,092	25.54
46	346	27,738	27,565	689,187	24.85
47	354	27,392	27,215	661,622	24.15
48	367	27,038	26,854	634,407	23.46
49	379	26,671	26,481	607,553	22.78

MASSACHUSETTS LIFE TABLE.

BASED ON THE MORTALITY OF THE FIVE YEARS, 1893-97.

TABLE NO. 2. — Females — Concluded.

AGE.	Dying in Each Year of Age.	Born and Surviving at Each Age.	Population or Years of Life lived in and above Each Year of Age.	Years of Life Lived in and above Each Year of Age.	Expectation of Life at Each Year of Age.
x .	d_x .	l_x .	P_x .	Q_x .	E_x .
50,	395	26,292	26,094	581,072	22.10
51,	410	25,897	25,692	554,978	21.43
52,	423	25,487	25,275	529,286	20.77
53,	437	25,064	24,845	504,011	20.11
54,	457	24,627	24,398	479,166	19.46
55,	476	24,170	23,932	454,768	18.81
56,	494	23,694	23,447	430,836	18.18
57,	512	23,200	22,944	407,889	17.56
58,	530	22,688	22,423	384,445	16.95
59,	550	22,158	21,883	362,022	16.34
60,	572	21,608	21,322	340,139	15.74
61,	588	21,036	20,742	318,817	15.16
62,	606	20,448	20,145	298,075	14.58
63,	625	19,842	19,530	277,930	14.01
64,	644	19,217	18,895	258,400	13.45
65,	665	18,573	18,240	239,505	12.90
66,	689	17,908	17,563	221,285	12.36
67,	715	17,219	16,861	203,702	11.83
68,	743	16,504	16,132	186,841	11.32
69,	771	15,761	15,375	170,709	10.83
70,	793	14,990	14,593	155,334	10.36
71,	809	14,197	13,792	140,741	9.91
72,	821	13,388	12,977	126,949	9.48
73,	825	12,567	12,154	113,972	9.07
74,	824	11,742	11,330	101,818	8.67
75,	818	10,918	10,509	90,488	8.29
76,	806	10,100	9,697	79,979	7.92
77,	790	9,294	8,899	70,282	7.56
78,	768	8,504	8,120	61,383	7.22
79,	742	7,736	7,365	53,263	6.89
80,	711	6,994	6,638	45,898	6.56
81,	678	6,283	5,944	39,260	6.25
82,	640	5,605	5,285	33,316	5.94
83,	600	4,965	4,665	28,031	5.65
84,	559	4,365	4,085	23,366	5.35
85,	518	3,806	3,547	19,281	5.07
86,	476	3,288	3,050	15,734	4.79
87,	434	2,812	2,595	12,684	4.51
88,	393	2,378	2,181	10,089	4.23
89,	351	1,985	1,810	7,908	3.98
90,	310	1,634	1,479	6,098	3.73
91,	270	1,324	1,189	4,619	3.49
92,	232	1,054	938	3,430	3.25
93,	194	822	725	2,492	3.03
94,	160	628	548	1,767	2.81
95,	129	468	403	1,219	2.60
96,	100	339	289	816	2.41
97,	77	239	200	527	2.20
98,	55	162	134	327	2.02
99,	40	107	87	193	1.80
100,	27	67	53	106	1.58

MASSACHUSETTS LIFE TABLE.

BASED ON THE MORTALITY OF THE FIVE YEARS, 1893-97.

TABLE NO. 3.

AGE.			m_x .		P_x .		AGE.			m_x .		P_x .	
			ANNUAL MORTALITY PER UNIT AT EACH YEAR OF AGE.		PROBABILITY OF LIVING ONE YEAR FROM EACH AGE.					ANNUAL MORTALITY PER UNIT AT EACH YEAR OF AGE.		PROBABILITY OF LIVING ONE YEAR FROM EACH AGE.	
x .			Males.	Females.	Males.	Females.	x .			Males.	Females.	Males.	Females.
0,	.	.	.19095	.16287	.82569	.84939	50,	.	.	.01708	.01514	.98307	.98498
1,	.	.	.04313	.04087	.95778	.95995	51,	.	.	.01808	.01596	.98208	.98417
2,	.	.	.02030	.01933	.97990	.98085	52,	.	.	.01909	.01674	.98109	.98340
3,	.	.	.01411	.01403	.98599	.98607	53,	.	.	.02023	.01759	.97997	.98256
4,	.	.	.01084	.01004	.98922	.99001	54,	.	.	.02140	.01873	.97888	.98144
5,	.	.	.00815	.00835	.99188	.99168	55,	.	.	.02268	.01989	.97758	.98031
6,	.	.	.00655	.00663	.99347	.99339	56,	.	.	.02416	.02107	.97613	.97915
7,	.	.	.00536	.00550	.99464	.99452	57,	.	.	.02583	.02231	.97450	.97793
8,	.	.	.00447	.00456	.99556	.99546	58,	.	.	.02757	.02364	.97280	.97664
9,	.	.	.00386	.00396	.99616	.99606	59,	.	.	.02968	.02513	.97075	.97518
10,	.	.	.00326	.00349	.99675	.99652	60,	.	.	.03171	.02683	.96878	.97353
11,	.	.	.00292	.00306	.99709	.99695	61,	.	.	.03366	.02835	.96639	.97205
12,	.	.	.00277	.00307	.99722	.99693	62,	.	.	.03557	.03008	.96505	.97037
13,	.	.	.00297	.00336	.99703	.99665	63,	.	.	.03786	.03200	.96285	.96850
14,	.	.	.00362	.00400	.99640	.99601	64,	.	.	.04048	.03408	.96032	.96648
15,	.	.	.00428	.00473	.99573	.99528	65,	.	.	.04331	.03646	.95761	.96419
16,	.	.	.00489	.00539	.99511	.99464	66,	.	.	.04657	.03923	.95449	.96152
17,	.	.	.00530	.00573	.99471	.99429	67,	.	.	.05015	.04241	.95107	.95848
18,	.	.	.00577	.00610	.99425	.99392	68,	.	.	.05424	.04606	.94719	.95498
19,	.	.	.00621	.00647	.99381	.99356	69,	.	.	.05859	.05015	.94307	.95108
20,	.	.	.00667	.00683	.99335	.99320	70,	.	.	.06324	.05434	.93869	.94710
21,	.	.	.00710	.00716	.99292	.99286	71,	.	.	.06793	.05866	.93430	.94301
22,	.	.	.00752	.00733	.99251	.99268	72,	.	.	.07306	.06327	.92951	.93867
23,	.	.	.00792	.00756	.99212	.99249	73,	.	.	.07833	.06788	.92462	.93435
24,	.	.	.00824	.00773	.99179	.99230	74,	.	.	.08383	.07273	.91954	.92983
25,	.	.	.00851	.00791	.99153	.99212	75,	.	.	.08977	.07784	.91409	.92508
26,	.	.	.00873	.00812	.99131	.99192	76,	.	.	.09584	.08312	.90854	.92020
27,	.	.	.00892	.00831	.99112	.99170	77,	.	.	.10249	.08877	.90251	.91500
28,	.	.	.00912	.00850	.99092	.99154	78,	.	.	.10981	.09458	.89591	.90969
29,	.	.	.00933	.00870	.99072	.99134	79,	.	.	.11736	.10075	.88915	.90408
30,	.	.	.00950	.00890	.99054	.99114	80,	.	.	.12596	.10711	.88150	.89834
31,	.	.	.00966	.00910	.99039	.99094	81,	.	.	.13496	.11406	.87357	.89209
32,	.	.	.00978	.00923	.99026	.99077	82,	.	.	.14489	.12110	.86490	.88581
33,	.	.	.00988	.00949	.99017	.99055	83,	.	.	.15582	.12862	.85544	.87915
34,	.	.	.01001	.00961	.99004	.99043	84,	.	.	.16739	.13684	.84554	.87192
35,	.	.	.01017	.00984	.98988	.99021	85,	.	.	.18037	.14604	.83455	.86390
36,	.	.	.01037	.01000	.98968	.99005	86,	.	.	.19336	.15607	.82369	.85523
37,	.	.	.01058	.01023	.98948	.98982	87,	.	.	.20752	.16724	.81199	.84567
38,	.	.	.01079	.01044	.98927	.98962	88,	.	.	.22392	.18019	.79863	.83470
39,	.	.	.01101	.01063	.98905	.98942	89,	.	.	.24217	.19392	.78399	.82322
40,	.	.	.01123	.01083	.98881	.98923	90,	.	.	.26036	.20960	.76963	.81028
41,	.	.	.01150	.01109	.98857	.98897	91,	.	.	.28106	.22708	.75357	.79807
42,	.	.	.01180	.01128	.98827	.98878	92,	.	.	.30353	.24733	.73617	.77989
43,	.	.	.01215	.01152	.98792	.98855	93,	.	.	.33143	.26759	.71569	.76399
44,	.	.	.01255	.01176	.98753	.98831	94,	.	.	.35484	.29197	.69863	.74522
45,	.	.	.01302	.01200	.98706	.98802	95,	.	.	.38596	.32010	.67647	.72406
46,	.	.	.01359	.01255	.98650	.98753	96,	.	.	.42105	.34602	.65218	.70502
47,	.	.	.01430	.01301	.98581	.98708	97,	.	.	.45206	.38500	.63128	.67715
48,	.	.	.01513	.01367	.98498	.98643	98,	.	.	.51111	.41045	.59292	.65944
49,	.	.	.01608	.01431	.98404	.98579	99,	.	.	.57692	.45977	.55224	.62617
							100,	.	.	.64286	.50943	.51351	.59399

The following table presents the mean annual death-rates at each of thirteen periods or groups of years, beginning with birth, for the five years (1893-97). To these are added as a matter of convenience the death-rates at certain other groups (1-4, 0-9, etc.).

TABLE NO. 4.

Mean Annual Death-rates at Certain Periods of Life.

AGE PERIODS.	PERSONS.	MALES.	FEMALES.	AGE PERIODS.	PERSONS.	MALES.	FEMALES.
	Death-rate at Each Period.	Death-rate at Each Period.	Death-rate at Each Period.		Death-rate at Each Period.	Death-rate at Each Period.	Death-rate at Each Period.
0-4, . . .	56.23	60.12	52.22	45-54, . . .	15.78	16.67	14.88
5-9, . . .	5.75	5.69	5.82	55-64, . . .	28.18	30.42	26.00
10-14, . . .	3.25	3.11	3.40	65-74, . . .	55.34	59.67	51.37
15-19, . . .	5.48	5.29	5.68	75-84, . . .	107.22	116.20	99.88
20-24, . . .	7.40	7.48	7.32	85-94, . . .	199.71	223.50	184.81
25-34, . . .	9.06	9.33	8.78	95+, . . .	384.43	429.20	367.07
35-44, . . .	10.97	11.19	10.74				

Additional Groups or Periods.

1-4, . . .	21.86	22.38	21.33	1-19, . . .	8.61	8.62	8.60
0-9, . . .	31.93	33.97	29.83	20-59, . . .	12.24	12.73	11.74
1-9, . . .	13.10	13.31	12.89	60 and over, .	66.29	69.50	63.42
0-14, . . .	22.73	24.09	21.35				

LIBRARY OF CONGRESS



0 013 821 183 6 ●